SPECS Climate Prediction for Climate Services

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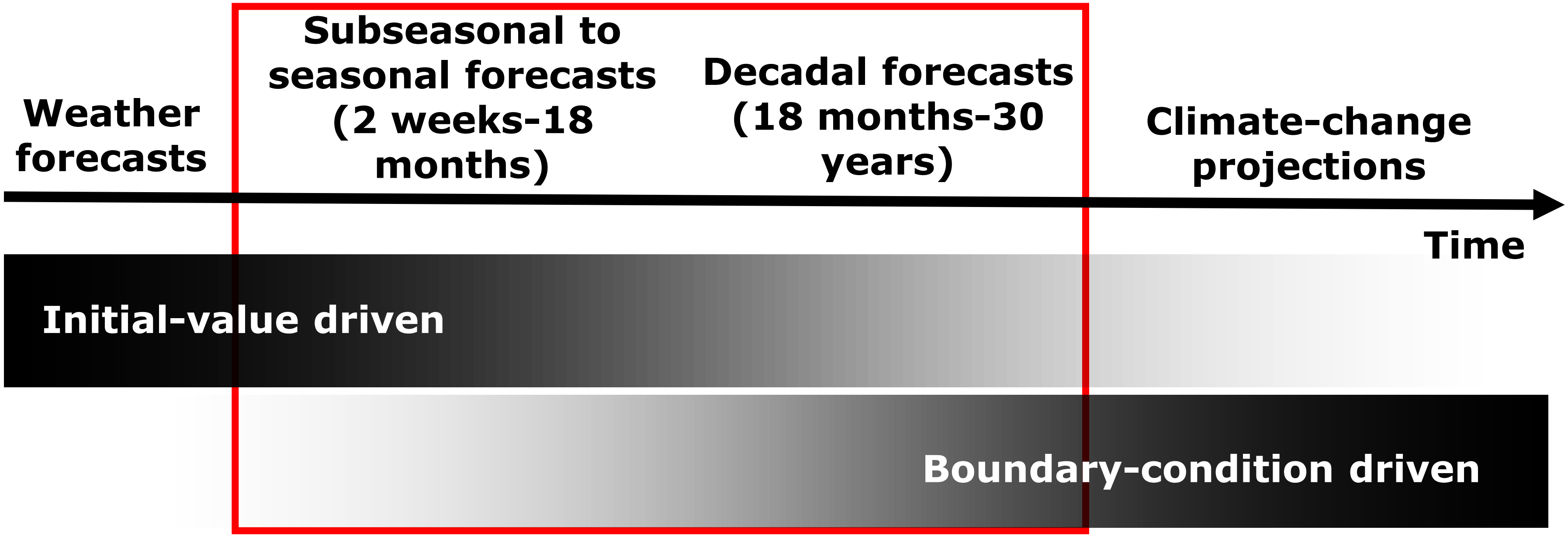
SPECS
Seasonal-to-decadal climate Prediction for the improvement of European Climate Services

BSC iCrea IC3

Climate prediction

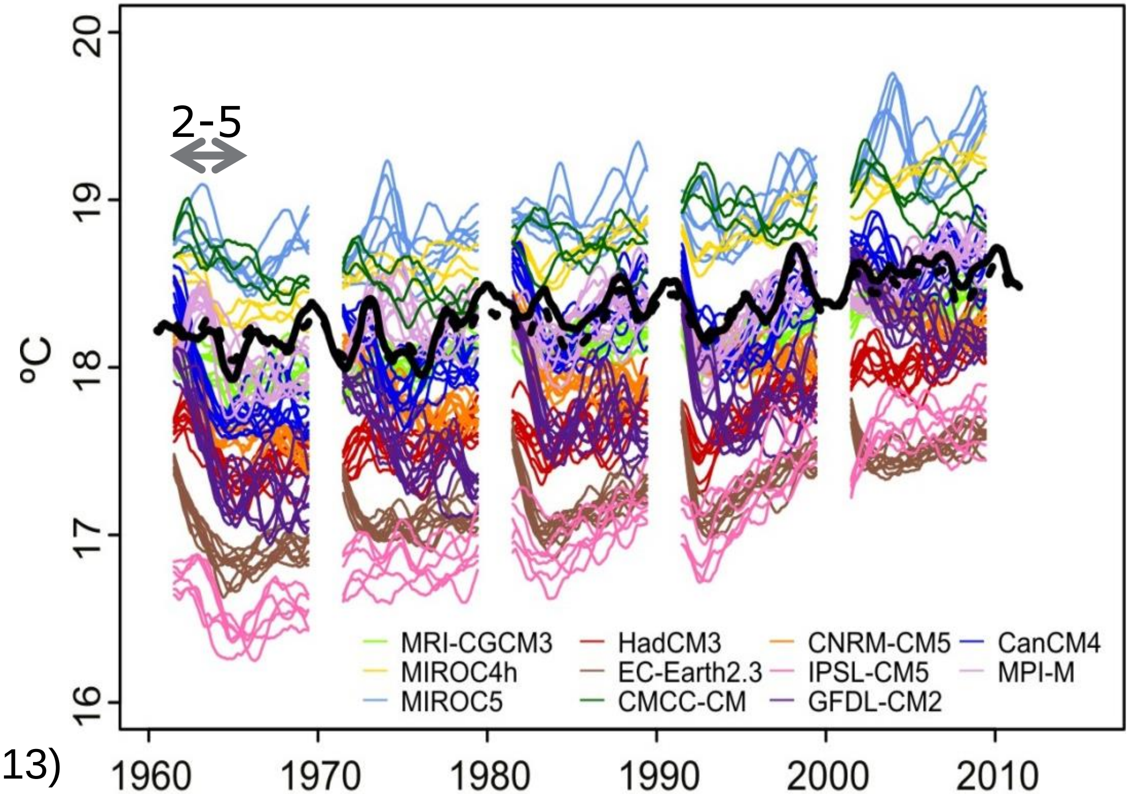
Progression from initial-value problems with weather forecasting at one end and multi-decadal to century projections as a forced boundary condition problem at the other, with climate prediction (sub-seasonal, seasonal and decadal) in the middle. Prediction involves initialization and systematic comparison with a simultaneous reference.



Adapted from Meehl et al. (2009)

Decadal forecast quality CMIP5

Global mean near-surface air temperature over the ocean (one-year running mean applied) from CMIP5 hindcasts. Each system is shown with a different colour. NCEP and ERA40/Int used as reference.
Examples of shock, drift and large systematic error can be found.



IPCC AR5 WGI (2013)

SPECS motivation

What: to produce quasi-operational and actionable local climate information

Why: need information with improved forecast quality, a focus on extreme climate events and enhanced communication and services for RCOFs, NHMSs and a wide range of public and private stakeholders

How: with a new generation of reliable European climate forecast systems, including initialised ESMs, efficient regionalisation tools and combination methods, and an enhanced dissemination and communication protocol

Where: over land, focus on Europe, Africa, South America

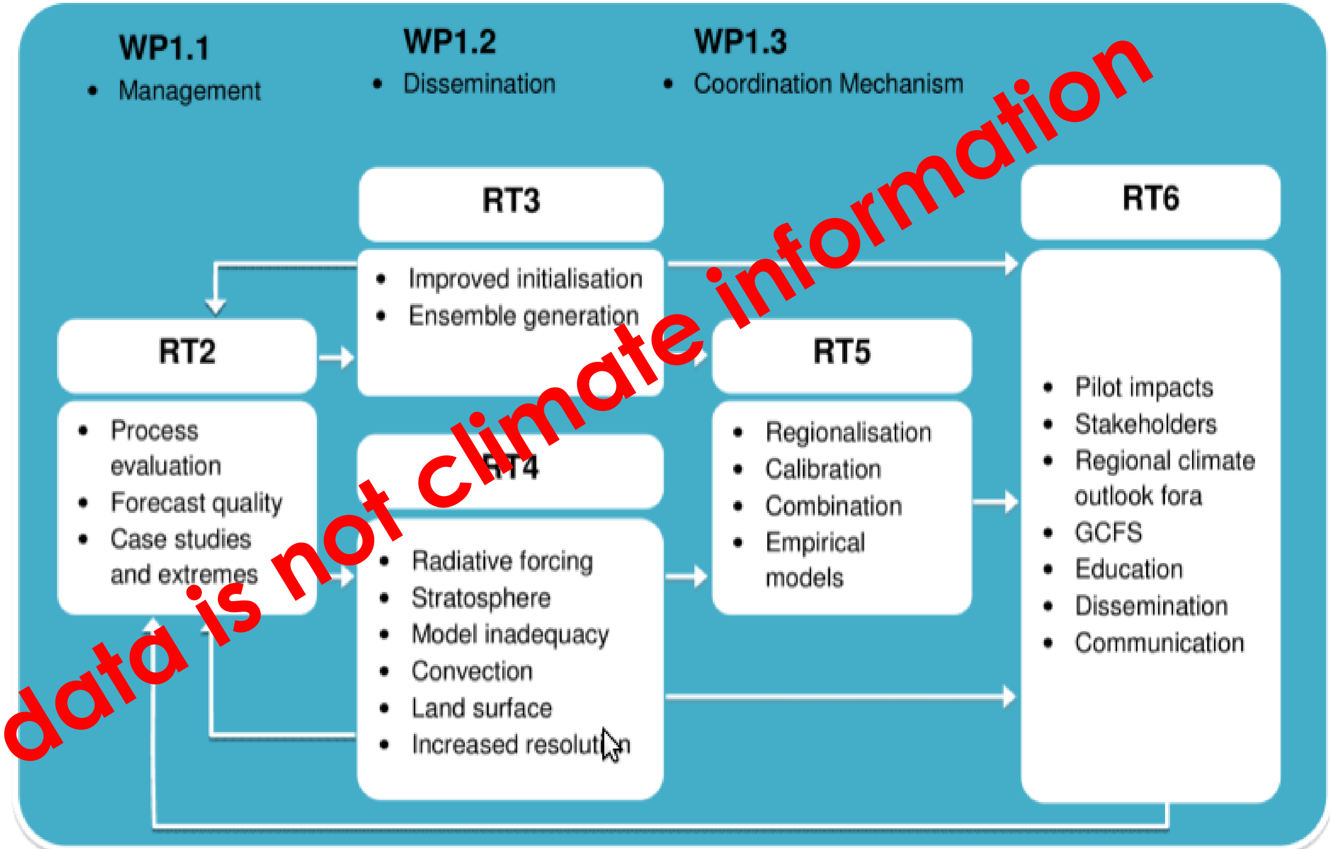
When: seasonal-to-decadal time scales over the longest possible observational period

http://www.specs-fp7.eu

SPECS: Overall strategy

Links to EUPORIAS/NACLIM, but also IS-ENES2, PREFACE, EUCLEIA, CLIPC, …

Forecast System	Project Partners
CNRM-CM5	CNRM, CERFACS
EC-Earth	KNMI, SMHI, IC3, ENEA
IFS/NEMO	ECMWF, UOXF
IPSL-CM5	CNRS
MPI-ESM	MPG, UniHH
UM	UKMET



WP1.1: Management
WP1.2: Dissemination
WP1.3: Coordination across EUPORIAS, NACLIM & SPECS
RT2: Evaluation of current s2d forecast systems
RT3: Forecast strategies
RT4: Improved systems
RT5: Calibrated predictions at the local scale

Climate data is not climate information

Generalised empirical forecasts

Empirical forecasts of one-month lead temperature (right panel) and precipitation using a wide range of observed predictors.

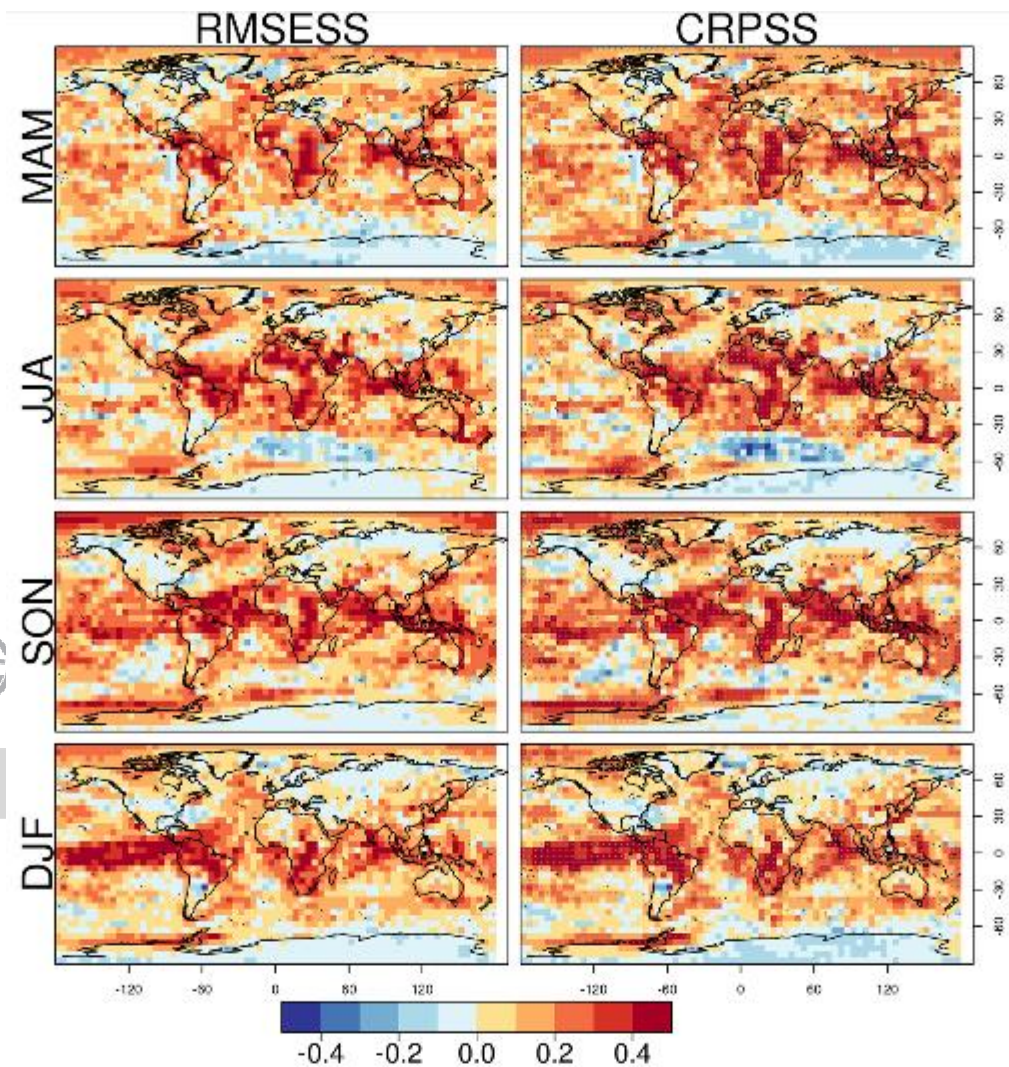
Geosci. Model Dev. Discuss., 8, 3941–3970, 2015
www.geosci-model-dev-discuss.net/8/3941/2015/
doi:10.5194/gmdd-8-3941-2015

Geoscientific Model Development
Discussions
Open Access

A global empirical system for probabilistic seasonal climate prediction

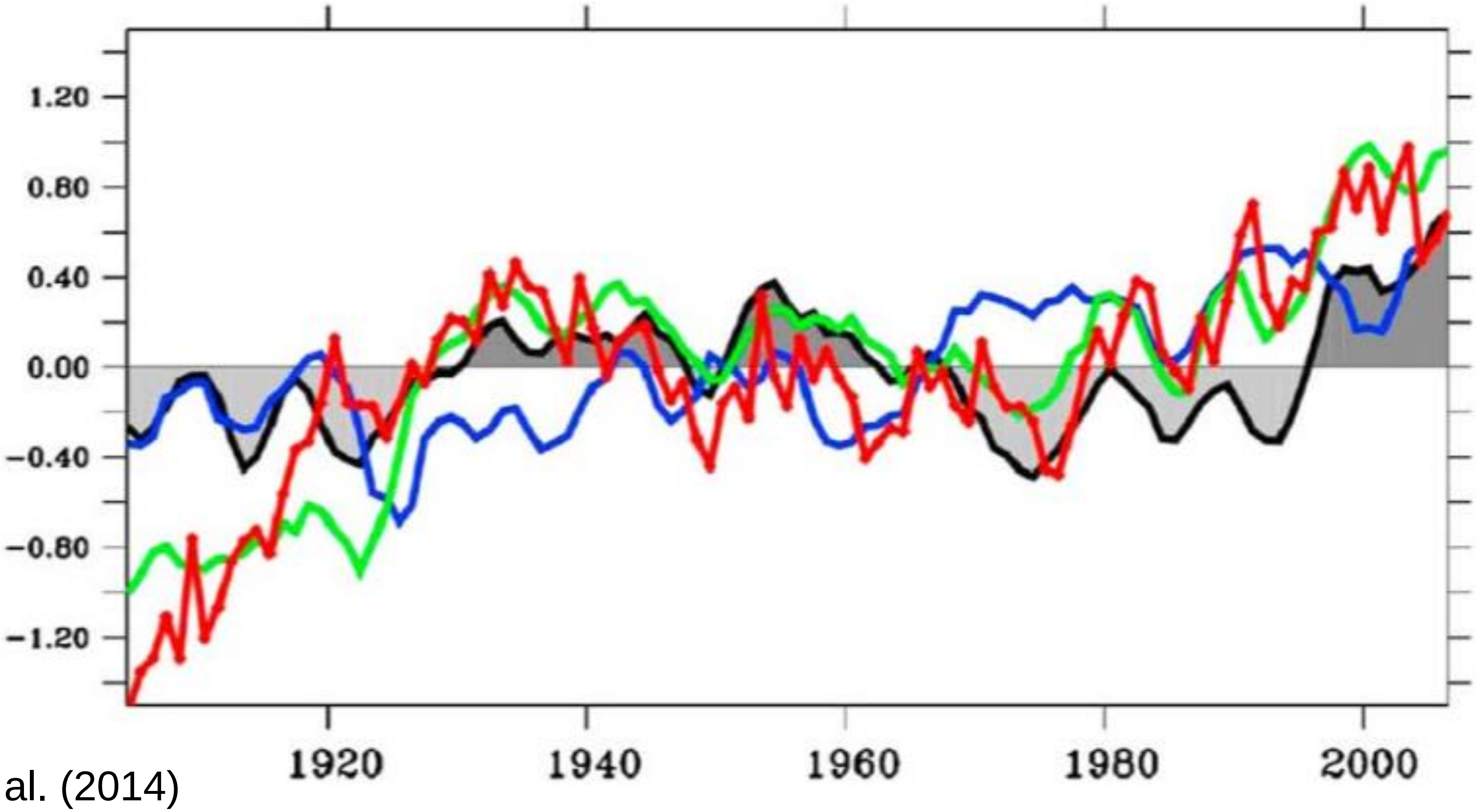
J. M. Eden[1], G. J. van Oldenborgh[1], E. Hawkins[2], and E. B. Suckling[2]

Eden et al. (2015)



Starting before 1960

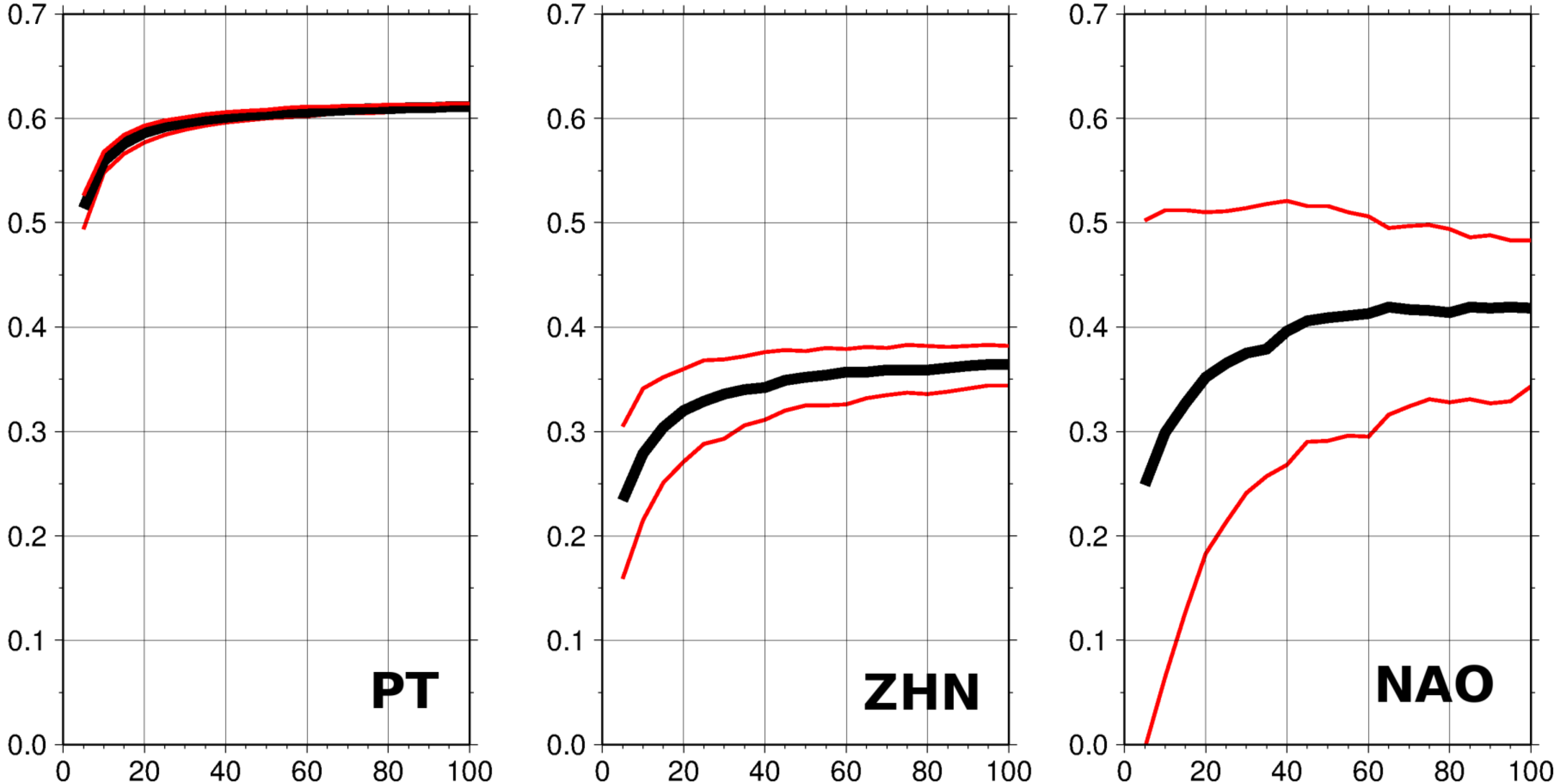
Four-year average SST over the North Atlantic (80ºW-10ºW,40ºN-60ºN) of (black) 20CR, (green) the assimilation simulation, (red) the 2-5 year MPI extended hindcasts and (blue) the uninitialzed run. The extended period improves the robustness of the results.



Müller et al. (2014)

No shortcuts: ensemble size

CNRM-CM's correlation for ensemble-mean predictions of DJF (one-month lead time) tropical precipitation, Northern Hemisphere Z500 and NAO as a function of the ensemble size. Red lines for 90% confidence interval.



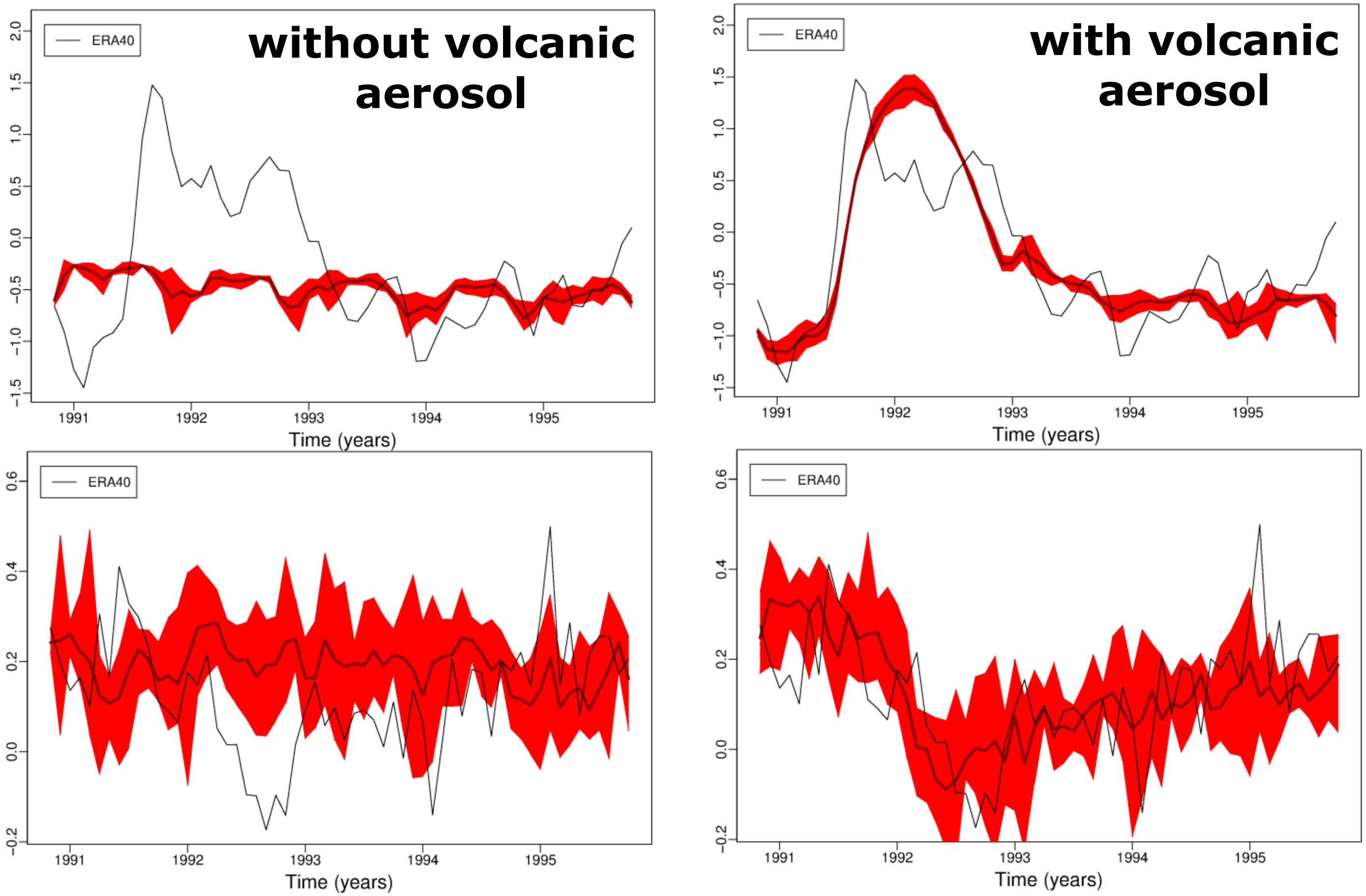
M. Déqué (Météo-France)

Eruptions and predictions

EC-Earth2.3 simulations of volcanic aerosol impact for Pinatubo. Five-member ensembles initialised on the 1 November 1990. **No consistent treatment of volcanic aerosol and ozone**.

T50

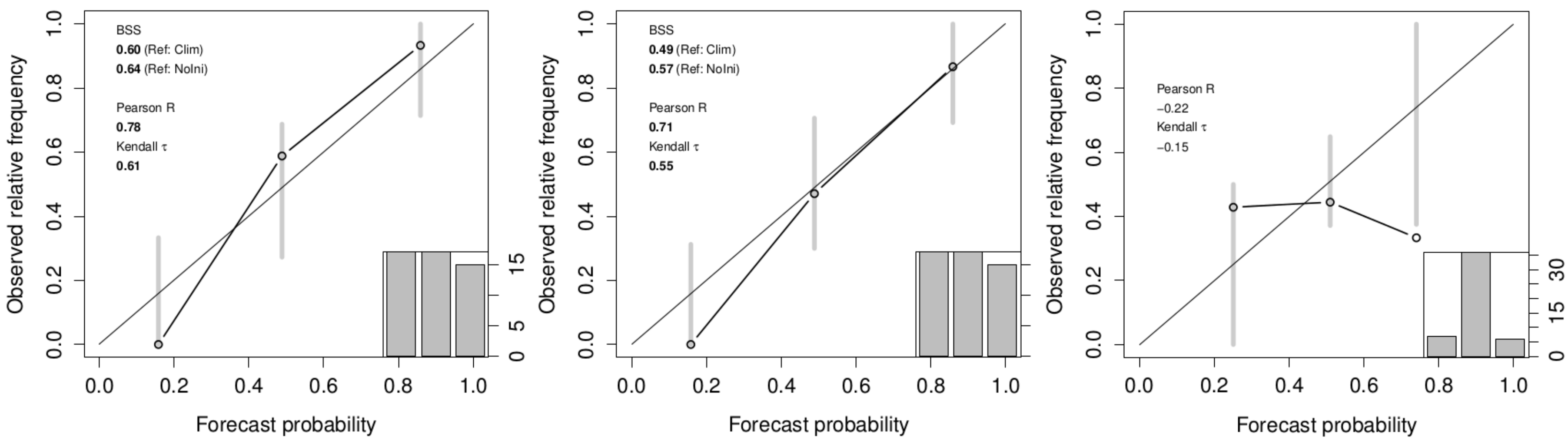
Near-surface air temperature



M. Ménégoz (IC3)

Service-driven forecasts

Reliability diagrams of initialised MME for left) basin-wide ACE and centre) U.S. ACE and right) uninitalised MME U.S. ACE 1-5 year forecasts for anomalies above the mean over 1961-2009. Statistically significant values are in bold.



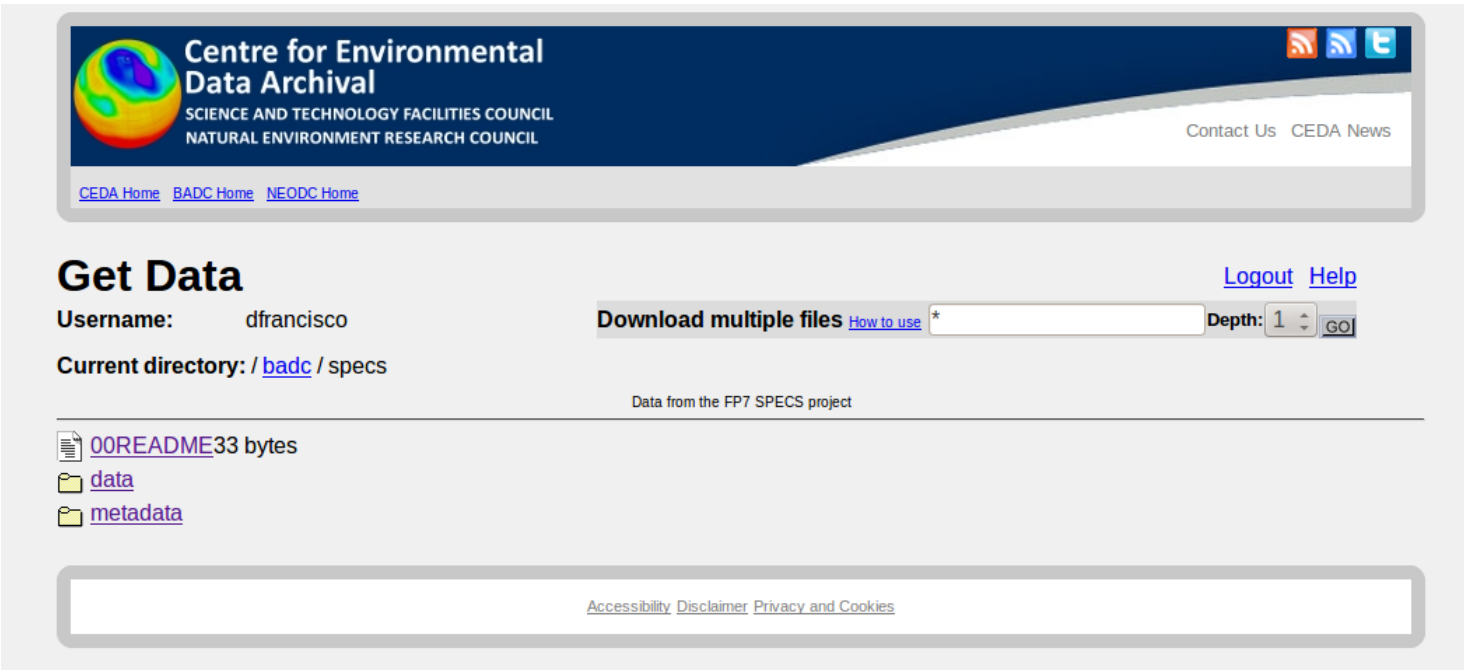
Caron et al. (2015)

Data dissemination

Centralised data repository at BADC with files using a convention building on both CMIP5 and CHFP and that is expected to become the basis for CMIP6.

Data published on the ESG after quality control reachable by other SPECS-related services (ECOMS UDG, Climate Explorer, etc).

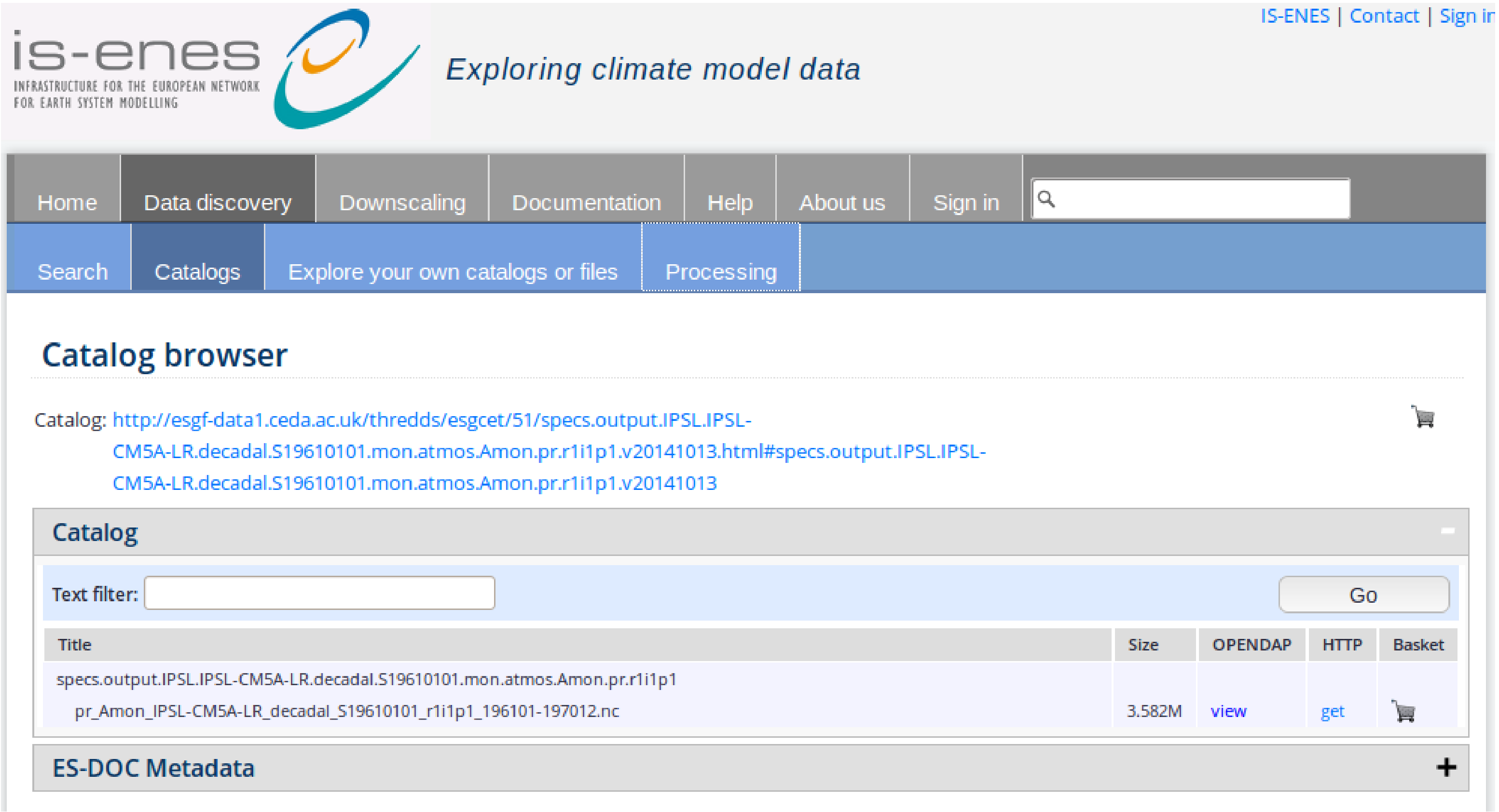
Multiple sensitivity experiments and NMME data available.



Downstream services

The SPECS data are now visible from the Climate4impact portal http://climate4impact.eu.

Lots of work still missing: e.g. use cases and processing demonstration video for climate predictions



Common tools for verification

GA 2014 verification demo

Aims and Agenda for the 2nd SPECS Verification Workshop [edit]

The aims of this short workshop are to:

- demonstrate new software that has been developed for verification;
- allow participants try this out on their own laptops;
- have a brief discussion about future needs and plans.

The planned agenda for the workshop is as follows:

Time Activity
11:00-11:20 Demo of UNEXE SpecsVerification software
11:20-11:40 Demo of IC3 S2dverification software
11:40-12:00 Demo of Meteo-Swiss verification software
12:00-12:45 Hands on session for participants to try out software
12:45-13:00 Brief discussion about future needs and plans

All these packages run in the freely available R language. See the R project site www.r-project.org to download R. Please also consider loading in your favourite forecast and observation data beforehand so that you can try out the verification on your own data.

More information about the new software is given below ...

- SpecsVerification Demo talk-Media:Specsverification.pdf
- S2dverification Demo talk-Media:s2dverification.pdf
- Meteo-Swiss verification Demo talk-Media:veri.pdf

Fact sheets

A series of fact sheets has been started (available from the SPECS web site). Common vocabulary with EUPORIAS, targeting a wide audience, mimicking some material already existing to explain what climate change is.

SPECS Fact sheet #2

What is a decadal prediction?

October 2014

Weather is chaotic which limits its predictability to one or two weeks This means that it will never be possible to extend normal weather forecasts to seasonal time-scales and beyond.

For example, we will never be able to predict the weather on a specific date in a specific place years in advance. However, **changes in *prevailing* weather over the course of several months to years are potentially predictable**. For instance we may be able to say if a particular region might expect, on average, colder winters or drier summers. Such changes in weather patterns occur due to the interaction of the atmosphere with more slowly varying parts of the Earth system.

Weather is a result of energy moving through the Earth system. Energy is originally radiated to the Earth from the Sun, with most being re-emitted or reflected back to space. The amount that remains in the Earth system is modulated by many things: some emerge naturally within the system (*internal variability*), whilst others are controlled by external factors such as variations in solar output, greenhouse gases, and atmospheric particles